WHAT IS CLAIMED AS NEW AND IS DESIRED TO BE SECURED BY LETTERS PATENT OF UNITED STATES is:

1. A constant linear velocity optical disc having a track for recording information with a constant linear velocity, said track including track segments spaced from each other by a constant pitch with each track segment providing a predetermined data area,

wherein each track segment has a railroad length that is an integral multiple of a length of a sector contained therein,

wherein the length of each sector contained in each track portion is 2 x π x N times the track pitch, N being a positive integer, and

wherein the head positions of said track segments are lined up on a predetermined radius line and spaced apart by said track pitch.

2. The constant linear velocity optical disc as defined in claim 1,

wherein the track segments each have a head sector at each head position and further include an integral number of sectors so as to from the predetermined data area.

3. A method of formatting a constant linear velocity optical disc having a track for recording information with a constant linear velocity comprising the steps of:

providing plural track segments of the track that each from a predetermined data area;

spacing each track segment from the other track segments by a constant pitch;

providing each track segment with a railroad length that is an integral multiple of a length of a sector contained therein;

making the length of said sector on each of the track segments equal to 2 x π x N times said track pitch, the number N being a positive integer; and

lining up the head positions of said track segments on a predetermined radius line

with said head positions being spaced apart by said track pitch.

4. The method of formatting the constant linear velocity optical disc as defined in Claim 3,

wherein the track segments each have a head sector at each head position and further include an integral number of sectors to from the predetermined data area.

5. A constant linear velocity optical disc having a track thereon for recording information in predetermined data areas with a constant linear velocity comprising:

plural segments of the track spaced apart from each other by a constant track pitch providing the predetermined data areas; and

each of said segments are provide with an integral number of sectors, each sector having a length of 2 x π x N times the track pitch, N being a positive integer,

wherein a railroad length of each said segment is an integral multiple of the length of a sector contained therein, and

wherein the head positions of said segments are lined up on a predetermined radius line and spaced apart by said track pitch.

6. The constant linear velocity optical disc as defined in claim 5,

wherein the segments each have a head sector at each head position and further include an integral number of said sectors to form the predetermined data area.

7. A constant linear velocity disc format for a spiral track having segments spaced from each other by a track pitch, said format providing each of the segments with a succession of sectors that each have a sector length that is integral multiple of 2 x π x the track pitch,

wherein fixed-length track marks are provided so as to be respectively arranged at an

equal physical length interval along said segments;

wherein each track mark of a present segment and each track mark of other segments adjacent thereto are detected; and

wherein, by detecting said track marks of said present segment and said other segments adjacent thereto, information of positions of said segments is available.

8. The constant linear velocity disc format as defined in claim 7,

wherein positional information of the present segment is obtained from information of a radius position of said present segment and information of a distance between said track marks of said other segments adjacent to said present segment.

9. The constant linear velocity disc format as defined in claim 7,

wherein the fixed-length of said track marks is equal to an integer times $2 \times \pi \times$ the track pitch, or equal to one divided by an integer times $2 \times \pi \times$ the track pitch.

10. The constant linear velocity disc format as defined in claim 7,

wherein the distance between said track marks defines a logical track length.

11. The constant linear velocity disc format as defined in Claim 7,

wherein the distance between said track marks is equal to a sector length.

12. The constant linear velocity disc format as defined in Claim 7,

wherein the distance between said track marks is equal to one divided by an integral multiple of a sector length.

13. The constant linear velocity disc format as defined in Claim 7,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

14. The constant linear velocity disc format as defined in Claim 8,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

15. The constant linear velocity disc format as defined in Claim 9,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

16. The constant linear velocity disc format as defined in Claim 10,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

17. The constant linear velocity disc format as defined in Claim 11,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

18. The constant linear velocity disc format as defined in Claim 12,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

19. A constant linear velocity disc format for a spiral groove track having groove track segments spaced from each other by a track pitch, said format providing each of the groove track segments with a succession of sectors that each have a sector length that is an

integer times 2 x π x the track pitch,

wherein fixed-length track marks are provided so as to be respectively arranged at an equal physical length interval on land portions between the groove segments,

wherein each track mark of a present groove segment and each track mark of groove segments adjacent thereto are detected, and

wherein, by detecting said track marks of said present groove segment and said groove segments adjacent thereto, information of positions of said groove segments is available.

20. The constant linear velocity disc format as defined in Claim 19,

wherein positional information of the present groove segment is obtained from information of a radius position of said present groove segment and information of a distance between said track marks of said groove segments adjacent to said present groove segment.

21. The constant linear velocity disc format as defined in Claim 19,

wherein the fixed-length of said track marks is equal to an integer times 2 x π x the track pitch, or equal to one divided by an integer times 2 x π x the track pitch.

22. The constant linear velocity disc format as defined in Claim 19,

wherein the distance between said track marks is equal to a logical track length.

23. The constant linear velocity disc format as defined in Claim 19,

wherein the distance between said track marks is equal to a sector length.

24. The constant linear velocity disc format as defined in Claim 19,

wherein the distance between said track marks is equal to one divided by an integral multiple of a sector length.

25. The constant linear velocity disc format as defined in Claim 19,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

26. The constant linear velocity disc format as defined in Claim 20,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

27. The constant linear velocity disc format as defined in Claim 21,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

28. The constant linear velocity disc format as defined in Claim 22,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

29. The constant linear velocity disc format as defined in Claim 23,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

30. The constant linear velocity disc format as defined in Claim 24,

wherein a code for specifying plural divided zones in which a distance between adjacent track marks in a radial direction of said disc is changed is provided on a present track mark.

31. An optical disc medium recording and reproducing apparatus in which track marks are arranged at a predetermined distance on a spiral track formed on said optical disc medium, a pickup is moved in the radius direction of said optical disc medium by a moving motor, and operations of recording and reproducing information on said optical disc medium are performed by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium comprising:

distance calculating means for calculating the distance between said track marks arranged on adjacent tracks on the basis of the detection information of said track marks detected by said pickup;

position detecting means for detecting a position of said pickup in the radius direction of said optical disc medium; and

movement control means for controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor on the basis of the distance data between said track marks calculated by said distance calculating means for calculating the distance between said track marks and the position data detected by said position detecting means.

32. An optical disc medium recording and reproducing apparatus in which track marks are arranged at a predetermined distance on a spiral track formed on said optical disc medium, a pickup is moved in the radius direction of said optical disc medium by a moving motor, and operations of recording and reproducing information on said optical disc medium by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium comprising:

distance calculating means for calculating the distance between said track marks

arranged on adjacent tracks on the basis of the detection information of said track marks detected by said pickup;

standard position detecting means for detecting a standard position of said pickup in the radius direction of said optical disc medium;

position calculating means for calculating the position of said pickup in the radius direction of said optical disc medium on the basis of the detected standard position of said pickup in the radius direction of said optical disc medium; and

movement control means for controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor on the basis of the distance data between said track marks calculated by said distance calculating means for calculating the distance between said track marks and the standard position data calculated by said position calculating means.

33. A method of recording and reproducing an optical disc medium comprising the steps of:

arranging track marks at a predetermined distance on a spiral track formed on said optical disc medium;

moving a pickup in the radius direction of said optical disc medium by a moving motor;

performing the operations of recording and reproducing information on said optical disc medium by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium;

calculating the distance between said track marks arranged on adjacent tracks on the basis of the detection information of said track marks detected by said pickup;

detecting a position of said pickup in the radius direction of said optical disc medium; and

controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor based on the calculated distance between said track marks and the detected position data.

34. A method of recording and reproducing an optical disc medium comprising the steps of:

arranging track marks at a predetermined distance on a spiral track formed on said optical disc medium;

moving a pickup in the radius direction of said optical disc medium by a moving motor;

performing the operations of recording and reproducing information on said optical disc medium by use of said pickup in a rotative state of a CLV mode caused by a rotation motor of said optical disc medium;

calculating the distance between said track marks arranged on adjacent tracks based on the detection information of said track marks detected by said pickup;

detecting a standard position of said pickup in the radius direction of said optical disc medium;

calculating the position of said pickup in the radius direction of said optical disc medium based on the detected standard position of said pickup in the radius direction of said optical disc medium; and

controlling the movement of said pickup to a target address position independently from the setting of said CLV mode by use of said rotation motor based on the calculated

distance between said track marks and the calculated position data of the pickup in the radius direction.

35. An optical disc master board exposing apparatus comprising:

a laser light source configured to emit laser light for exposing the optical disc master board painted with a photoresist;

an exposure signal generating unit configured to generate an exposure signal in synchronism with a fundamental clock;

a light modulator configured to receive and on and off modulate said emitted laser light on the basis of said exposure signal;

an optical pickup including a focusing optical system configured to receive said on and off modulated laser light from said light modulator and to then focus said received laser light on to said optical disc master board as an exposure spot;

a spindle motor configured to rotate said optical disc master board;

a slider configured to move said optical pickup in a radius direction of said optical disc master board;

a spindle encoder configured to output a pulse train corresponding to the rotation of said spindle motor;

a linear encoder configured to output another pulse train corresponding to the position of said exposure spot on said optical disc master board; and

a movement control loop configured to control the rotation of said spindle motor based on rotation and the pulse train output of said spindle encoder,

wherein said spindle motor and said slider are further configured to be CLV-driven; and

wherein the fundamental clock is configured to provide a pulse train divided to have a frequency proportional to an ideal railroad track length and a spindle rotation ordering pulse train and a slider movement ordering pulse train are generated per one revolution of said spindle motor to thereby generate a CLV drive ordering pulse.

36. The optical disc master board exposing apparatus as defined in claim 35,

wherein, in a segment in which one revolution of said spindle motor is divided by an equal rotation angle or optional rotation angles, the frequency of said pulse train of said fundamental clock is divided and said spindle rotation ordering pulse train and said slider movement ordering pulse train are generated to thereby generate said CLV drive ordering pulse.

37. A method of generating a CLV drive ordering pulse in an optical disc master board exposing apparatus comprising the steps of:

emitting laser light from a laser light source for exposing the optical disc master board painted with a photoresist;

generating an exposure signal for exposing said optical disc master board in synchronism with a fundamental clock;

on and off modulating said laser light emitted from said laser light source on based said exposure signal;

focusing said on and off modulated laser light on to said optical disc master board as an exposure spot;

rotating said optical disc master board by use of a spindle motor;

moving said optical pickup in the radius direction of said optical disc master board by use of a slider;

outputting a pulse train corresponding to the rotation of said spindle motor from a spindle encoder;

outputting another pulse train corresponding to the position of said exposure spot on said optical disc master board from a linear encoder;

controlling the rotation of said spindle motor based on the pulse output of said spindle encoder;

CLV-driving said spindle motor and said slider; and

dividing the frequency of the pulse train of said fundamental clock and generating a spindle rotation ordering pulse train and a slider movement ordering pulse train per one revolution of said spindle motor to thereby create a CLV drive ordering pulse.

38. The method of generating the CLV drive ordering pulse in the optical disc master board exposing apparatus as defined in Claim 37,

wherein the dividing the frequency of said pulse train of said fundamental clock and the generating of said spindle rotation ordering pulse train and said slider movement ordering pulse train to thereby generate said CLV drive ordering pulse occurs in a segment in which one revolution of said spindle motor is divided by an equal rotation angle or optional rotation angles.

39. A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 35,

wherein a physical fundamental length is set such that increased railroad track length during the time period of one revolution of said spindle is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to $2 \times \pi \times P$ and P is a track pitch;

and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

40. A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 36,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is made equal to $P \times \theta_c^2/(2 \times \pi)$ and P is a track pitch; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

41. A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 35,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to $\pi \times P$ and P is a track pitch; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

42. A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 36,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to $\theta_c^2/(4 \times \pi)$ and P is a track pitch; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

43. A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 35,

wherein a physical fundamental length is set such that increased railroad track length of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to $2 \times \pi \times R_o$ and R_o is the CLV disc format starting radius; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

44. A CLV disc format produced by the optical disc master board exposing apparatus as defined in Claim 36,

wherein a physical fundamental length is set such that increased railroad track length

of a segment in which one revolution of said spindle motor is divided with an equal rotation angle or optional rotation angles is made equal to an integral multiple of or a finite number times the period of said fundamental clock;

wherein said increased railroad track length is equal to θ_c x R_o and R_o is the CLV disc format starting radius; and

wherein said finite number has a value that can be realized at a time of performing the calculation by use of hardware or software.

45. The CLV disc format as defined in Claim 39,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to π x P or $\theta_c^2/(4x\pi)$ at a first track turn and a same length increase is made equal to 2 x π x P or P x θ_c^2 (2 x π) at a second track turn and other tracks turns subsequent thereto when said CLV drive ordering pulse is generated; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

46. A method of generating the CLV drive ordering pulse in the optical disc master board exposing apparatus as defined in Claim 37 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or the rotation divided by an equal

rotation angle or optional rotation angles;

making a railroad track length increase for a first track turn after starting the CLV drive equal to π x P or $\theta_c^2/(4 \times \pi)$;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to 2 x π x P or P x $\theta_c^2/(2 \times \pi)$;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

47. A CLV disc format as defined in Claim 41,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to π x P or $\theta_c^2/(4 \times \pi)$ at a first track turn and the same length increase is made equal to 2 x π x P or P x $Q_c^2/(2 \times \pi)$ at a second track turn and other track turns subsequent thereto when said CLV drive ordering pulse is generated; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

48. A method of generating the CLV drive ordering pulse in the optical disc master board exposing apparatus as defined in Claim 38 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation

angle or optional rotation angles;

making a railroad track length increase for a first track turn after starting the CLV drive equal to π x P or $\theta_c^2/(4 \times \pi)$;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to 2 x π x P or P x $\theta_c^2/(2 \times \pi)$;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

49. The CLV disc format as defined in Claim 43,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to π x P or $\theta_c^2/(4 \times \pi)$ at a first track turn and a same length increase is made equal to 2 x π x P or P x $Q_c^2/(2 \times \pi)$ at a second track turn and other track turns subsequent thereto when said CLV drive ordering pulse is generated; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

50. A method of providing the disc format as defined in Claim 40 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an

equal rotation angle or optional rotation angles;

making a railroad track length increase for a first track turn after starting the CLV drive equal to π x P or $\theta_c^2/(4 \times \pi)$;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to 2 x π x P or P x $\theta_c^2/(2 \times \pi)$;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

51. The CLV disc format as defined in Claim 40,

wherein a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement is made equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an equal rotation angle or optional rotation angles;

wherein a railroad track length increase per each respective track turn after starting the CLV drive is made equal to π x P or $\theta_c^2/(4 \times \pi)$ at a first track turn and a same length increase is made equal to 2 x π x P or P x $\theta_c^2/(2 \times \pi)$ at the second track and other track turns subsequent thereto and said CLV drive ordering pulse is generated; and

wherein the drive of said spindle motor is performed utilizing said CLV drive ordering pulse.

52. The method of providing the CLV disc format as defined in Claim 42 further comprising the steps of:

making a revolution rate of said spindle motor at a format exposure starting position and in a state of stopping a lateral movement equal to an integral multiple of said fundamental clock frequency in a segment of one rotation angle or a rotation divided by an

equal rotation angle or optional rotation angles;

making a railroad track length increase for a first track turn after starting the CLV drive equal to π x P or $\theta_c^2/(4 \times \pi)$;

making the railroad track length increase per each respective track turn subsequent to the first track turn after starting the CLV drive equal to 2 x π x P or P x $\theta_c^2/(2x\pi)$;

generating said CLV drive ordering pulse; and

performing the drive of said spindle motor utilizing said CLV drive ordering pulse.

53. A recording medium made by the method as defined in Claim 46.

54. A recording medium made by the method as defined in Claim 48.

55. A recording medium made by the method as defined in Claim 50.

56. A recording medium made by the method as defined in Claim 52.

57. The constant linear velocity optical disc as defined in claim 1,

wherein, in a spiral track of equal pitch formed by CLV driving, the railroad track length L of a spiral track turn is expressed by:

$L = \pi \times (r^2-Ro^2)/P$,

where,

$r = Ro + n \times P$ (n=1, 2, 3, ···);

wherein, Ro represents a radius position of starting the spiral track, r represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer representing a number of track segments, and L can also be expressed as:

$L = 2 \times \pi \times Ro \times n + n^2 \times \pi \times P$ (n=1, 2, 3, ···);

wherein railroad track length Ln of respective spiral track turn segments can be

expressed as:

$L = 2 \times \pi \times Ro + (2xn-1) \times \pi \times P$ (n=1, 2, 3, ⋯);

wherein railroad track length Ln of a respective required segment can be expressed as:

$Ln = 2 \times \pi \times Ro + (2 \times n-1) \times \pi \times P$ (n=1, 2, 3 ⋯);

with a railroad track segment length difference between adjacent spiral track segment being a constant:

$2 \times \pi \times P$;

wherein, when a sector head position on each track segment is a standard position an increasing railroad track length (sumdLm) is obtained at a position preceded by m tracks and a relationship between the increasing railroad track length (sumdLm) and the other constants can be expressed as:

$sumdLm = 2 \times \pi \times P(1+2+3+\cdots+m)$

$sumdLm = \pi \times P \times m(m+1)$.

58. The constant linear velocity optical disc as defined in Claim 57,

wherein, when the railroad track segment length difference between adjacent track segments is $2 \times \pi \times P$ and further when a sector head position on a track turn is taken as a standard position, an increasing railroad track length (sumdLm) is obtained at a position preceded by m tracks and a relationship between the increasing railroad track length (sumdLm) and the other constants is:

$sumdLm = 2 \times \pi \times P(1+2+3+\cdots+m)$

$sumdLm = \pi P \pi m(m+1)$;

wherein, when the sector head positions are arranged at equal track intervals on a radius line, sectors of integer number No are contained on an information area corresponding

to an inner circumferential track segment no thereof and the sector length is an integer (Ns) times $2 \times \pi \times P$, the relationship between Lno, Ro, no, P, Ns, No, and the sector length can be expressed as:

$$Lno = 2 \times \pi \times Ro + (2 \times no - 1) \times \pi \times P$$

$$Lno = 2 \times \pi \times P \times Ns \times No, \text{ and}$$

$$2 \times \pi \times P \times Ns = [\text{Sector Length}];$$

wherein both Ns and No are integers and in a track segment (n-1), since the railroad track length difference from the track segment no to the track segment (n-1) is an integer times the sector length, the relationship between the constants is further:

$$(n - 1 - no) \times (n - no) = 2 \times Ns \times Nx \text{ ;}$$

wherein both Ns and Nx are integers, and furthermore, in the track segment n, the relationship therebetween can be expressed as:

$$Ln = 2 \times \pi \times Ro + (2 \times n - 1) \times \pi \times P$$

$$Ln = 2 \times \pi \times P \times Ns \times No' \text{ ;}$$

wherein both Ns and No' are integers, the head positions of the sector are arranged on the same radius line and the following equations can be obtained:

$$2 \times \pi \times Ro = 2 \times \pi \times P \times Ns \times No - 2 \times \pi \times P \times no + \pi \times P, \text{ and}$$

$$n - no = Ns \times (No' - No);$$

wherein, when n - no is an integer M (n-no = M), then integers M, Nx, No', and No exist that satisfy:

$$M \times (M-1) = 2 \times Ns \times Nx, \text{ and}$$

$$M = Ns \times (No'-No);$$

wherein, there are further two cases in which Ns is odd or Ns is even;

wherein, when Ns is odd and M is equal to Ns, the following equation holds:

$Ns \times (Ns-1) = Ns \times (2 \times Nx)$

and the number Nx is:

$Nx = (Ns - 1)/2 = (\text{Odd Number})/2$

$= \text{Integral Number (Integer)}$,

and thereby, number Nx exists and also the following relationship (equation) can be obtained:

$(No' - No) = 1$;

wherein, when Ns is an odd number, namely, the sector length is an odd number times $2 \times \pi \times P$, the number Nx is arranged (lined up), at least, per M = Ns tracks, and furthermore, the number of the sectors contained in the track is incremented by "1" successively;

wherein, when Ns is an even number and M is equal to 2 x Ns, the following equation holds:

$2 \times Ns \times (2 \times Ns-1) = 2 \times Ns \times Nx$,

and the number Nx can be expressed as:

$Nx = 2 \times Ns - 1$

$= \text{Integral Number (Integer)}$,

and thereby, the number Nx exists and also satisfies the equation:

$(No' - No) = 2$;

wherein, when Nx is an even number, namely, the sector length is an even number times $2 \times \pi \times P$, the number Nx is arranged (lined up), at least, per M = 2 x Ns tracks, and furthermore, the number of the sectors contained in the track is incremented by "2" successively.

59. The constant linear velocity disc format as defined in claim 7,

wherein, in a spiral track of equal pitch formed by the CLV driving, the railroad track length L of an entire track can be expressed by:

$L = \pi \times (r^2\text{-}Ro^2)/P$, and

$r = Ro + n \times P$ $(n=1,2,3,\cdots)$;

wherein Ro represents a radius position of starting a spiral track, r represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer;

wherein L can be stated as:

$L = 2 \times \pi \times Ro \times\ n + n^2 \times \pi \times P$ $(n=1,2,3\ \cdots)$;

wherein, the railroad length Ln of respective spiral track segments can be expressed as:

$Ln = 2 \times \pi \times Ro + (2 \times n\text{-}1) \times \pi \times P(n=1,2,3\ \cdots)$;

with a railroad track segment length difference between adjacent spiral track turns being a constant $2 \times \pi \times P$ and when a sector head position on a track segment is a standard position, an increasing railroad track length (sumdLm) is obtained at a position preceded by m tracks and a the relationship between the increasing railroad track length (sumdLm) and the other constants is:

$sumdL_m = 2 \times \pi\ P(1+2+3+\cdots+m)$

$sumdL_m = \pi \times P \times m(m+1)$;

and when the sector head position on a track is also taken as the standard position and the adjacent track length difference of the increasing railroad track length (sumdLm) is obtained at the position preceding by m tracks the relationship between the adjacent track length difference and the other constants can be expressed as:

$dLm = sumdL_m - sumdL_m-1 = 2 \times \pi \times P \times m$.

60. The constant linear velocity disc format as defined in claim 19,

wherein, in a spiral track of equal pitch formed by CLV driving, the railroad track length L of an entire spiral track can be expressed as,

$L = \pi \times (r_2-Ro_2)/P$, and

$r = Ro + n \times P$ (n=1,2,3,···);

wherein Ro represents the radius position of starting the spiral track, r represents the radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer that represents a number of segments of the spiral track with;

$L = 2 \times \pi\, Ro \times n + n^2 \times \pi \times P$ (n=1,2,3 ···);

wherein, railroad length Ln of respective track segments can be expressed as:

$Ln = 2 \times \pi \times Ro + (2 \times n-1) \times \pi \times P$(n=1,2,3 ···);

with a railroad track segment length difference between adjacent spiral track segments being a constant $2 \times \pi \times P$ and when a sector head position on each track segment is a standard position, an increasing railroad track length ($sumdL_m$) is obtained at a position preceded by m tracks, the relationship between the increasing railroad track length ($sumdL_m$) and the other constants is:

$sumdL_m = 2 \times \pi \times P(1+2+3+\cdots+m)$

$sumdL_m = \pi \times P \times m(m+1)$; and

when the sector head position on a track is also the standard position and the adjacent track length difference of the increasing railroad track length ($sumdL_m$) is obtained at a position preceded by m tracks, a relationship exists between the adjacent track length

difference and the other constants which can be expressed by:

$dL_m = sumdL_m - sumdL^m\text{-}1 = 2 \times \pi \times P \times m.$

61. The optical disc medium recording and reproducing apparatus as defined in claim 31,

wherein, in a spiral track of equal pitch P formed on the optical disc, a railroad track length L of the entire spiral track thereof can be expressed as:

$L = \pi \times (r^2 - Ro^2)/P$, and

$R = Ro + n \times p(n=1,2,3,\cdots)$;

wherein, Ro represents a radius position of starting the spiral track, r represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer that represents a number of each spiral track segment and L can be expressed as:

$L = 2 \times \pi \times Ro \times n + n^2 \times \pi \times P(n=1,2,3,\cdots)$;

wherein, railroad track length Ln of respective spiral track segments can be expressed as:

$Ln = 2 \times \pi \times Ro + (2 \times n\text{-}1) \times \pi \times P(n=1,2,3,\cdots)$;

with a railroad track turn length difference dL between adjacent spiral track segments that can be expressed as:

$dL = 2 \pi \times Ro + (2n\text{-}1) \times \pi \times P,$

$dL= [2 \pi \times Ro + \{(2n\text{-}1)\text{-}1\} \times \pi \times P],$

$dL= 2 \times \pi \times P;$

wherein, when a head position of a specified sector at a standard position is taken as a standard position and the increasing railroad track length ($sumdL_m$) is obtained at a position

preceded by m tracks, a relationship between increasing railroad track length ($sumdL_m$) and the other constants can be expressed as:

$sumdL_m = 2 \times \pi \times P(1+2+3+\cdots+m)$; and

wherein, the track length difference dLm between adjacent tracks at the position preceded by m tracks can be expressed as:

$dL_m = \pi \times P \times m(m+1) - \pi \times P(m-1)\{(m-1)+1\}$

$dL_m = 2 \times \pi \times P \times m.$

62. The optical disc medium recording and reproducing apparatus as defined in claim 32,

wherein, in a spiral track of equal pitch P formed on the optical disc, a railroad track length L of the entire spiral track thereof is:

$L = \pi \times (r^2 - Ro_2)/P \cdots(1)$, and

$R = Ro + n \times p(n=1,2,3,\cdots)$;

wherein, Ro represents a radius position of starting the spiral track, r represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer that represents a number of each spiral track segment, and L can be expressed as;

$L = 2 \times \pi \times Ro \times n + n^2 \times \pi \times P\ (n=1,2,3,\cdots)$;

wherein, railroad track length Ln of respective spiral track segments can be expressed as:

$Ln = 2 \times \pi \times Ro + (2 \times n-1) \times \pi \times P\ (n=1,2,3,\cdots)$;

and a railroad track segment length difference dL between adjacent spiral track segments can be expressed as:

$dL = 2\ \pi \times Ro + (2n-1) \times \pi \times P$, and

$dL= [2\ \pi \times Ro + \{(2n-1)-1\} \times \pi \times P]$,

$dL= 2 \times \pi \times P$;

wherein, when a head position of a specified sector at a standard position is taken as a standard position and increasing railroad track length ($sumdL_m$)is obtained at a position preceded by m tracks, s relationship between increasing railroad track length ($sumdL_m$) and the other constants is:

$sumdL_m = 2 \times \pi \times P(1+2+3+\cdots+m)$;

and track length difference dLm between the adjacent track segments at the position preceded by m tracks can be expressed as:

$dLm = \pi \times P \times m(m+1) - \pi \times P(m-1)\ \{(m-1)+1\}$

$dLm= 2 \times \pi \times P \times m$.

63. The optical disc master board exposing apparatus as defined in claim 35,

wherein, in a spiral track of equal pitch P formed on the optical disc, a railroad track length L of the entire spiral track thereof is:

$L = \pi \times (r^2 - Ro^2)/P \cdots(1)$, and

$R = Ro + n \times p\ (n=1,2,3,\cdots)$;

wherein, Ro represents a radius position of starting the spiral track, r represents a radius position of the spiral track for measuring the railroad track length L, P represents the spiral track pitch, and n is a positive integer that represents a number of each spiral track segment, and L can be expressed as:

$L = 2 \times \pi \times Ro \times n + n^2 \times \pi \times P\ (n=1,2,3,\cdots)$;

wherein, railroad track length Ln of respective spiral track segments can be expressed

as:

$Ln = 2 \times \pi \times Ro + (2 \times n\text{-}1) \times \pi \times P$ (n=1,2,3,···);

with a railroad track turn length difference between adjacent spiral track segments being a constant $2 \times \pi \times P$ so that the length of each spiral track segment increases by $2\pi p$ per each of the spiral track segments or, instead of 2π, an optional angle is used for a segment unit, then:

$r = Ro + (s \times \theta_a) xp / (2 \times \pi)$ (n=1,2,3,···);

wherein, s is the number of the segments and θ_a may be allowed to be set at a large value or at a small value;

wherein, L can then be expressed as:

$L = Ro \times (s \times \theta_a)+P \times (s \times \theta_a)^2/(4 \times \pi)$ (s = 1,2,3,···) and

$L_a = Ro \times \theta_a +Px\ (2 \times s\text{-}1) \times \theta_a^2 / (4 \times \pi)$ (s = 1,2,3, ···);

wherein, the railroad track length difference dL between the adjacent tracks is a constant that can be expressed as:

$dL = P \times \theta_a^2/(2 \times \pi)=$ constant;

further wherein, a value Na of the pulse generator is increased by the length of $2 \times \pi \times P$ per each of the respective track segments in coincidence with a track segments length increase of $2 \times \pi \times P$ per one revolution of the spindle, and thereby a CLV drive ordering pulse train is generated, which can be expressed by the following equation:

$2 \times \pi\ xP / L_{cb}= N_{pa.s}$; and

wherein, Lcb is the minimum physical unit length for forming a format on the disc, and data bit, sector, and the track can be formed having an integral multiple of the unit length; and $N_{pa.s}$ includes an infinitely small fractional part.

64) An optical disc master board exposing apparatus comprising:

a laser light source emitting laser light for exposing a glass master board painted with a photoresist;

an exposure signal generating unit generating an exposure signal for exposing said glass master board in synchronism with a fundamental clock;

a light modulator turning on and off said laser light emitted from said laser light source based on of said exposure signal;

an optical pickup including a focusing optical system for focusing said laser light turned on and off by said light modulator and radiating said same laser light on said glass master board as an exposure spot;

a spindle motor rotating said glass master board;

a slider moving said optical pickup in a radius direction of said glass master board;

a spindle encoder outputting a pulse train corresponding to the rotation of said spindle motor;

a linear encoder outputting another pulse train corresponding to the position of said exposure spot on said glass master board;

a spindle rotation ordering pulse generating circuit for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, a number of spiral tracks, and a track pitch of said spiral;

a slider movement ordering pulse generating circuit for generating a slider movement ordering pulse train based on the starting radius position of said spiral, the number of said tracks, and the track pitch of said spiral;

a spindle control circuit for performing a feedback control operation of the revolution

rate of said spindle motor based on the spindle rotation ordering pulse train and the pulse train from said spindle encoder;

a slider control circuit for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder; and

a control section for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor and that of the slider are respectively controlled in accordance with said spindle rotation ordering pulse train and said slider movement ordering pulse train both generated from the pulse train of the frequency divided fundamental clock having pulse numbers proportional to the ideal railroad track length determined by the starting radius position of said spiral, the number of said tracks, and the track pitch of said spiral, per each one revolution of said spindle.

65. An optical disc master board exposing apparatus comprising:

a laser light source emitting laser light for exposing a glass master board painted with a photoresist;

an exposure signal generating unit generating an exposure signal for exposing said glass master board in synchronism with a fundamental clock;

a light modulator turning on and off said laser light emitted from said laser light source based on said exposure signal;

an optical pickup including a focusing optical system for focusing said laser light turned on and off by said light modulator and radiating said same laser light on said glass master board as an exposure spot;

a spindle motor rotating said glass master board;

a slider moving said optical pickup in a radius direction of said glass master board;

a spindle encoder outputting a pulse train corresponding to the rotation of said spindle motor;

a linear encoder outputting another pulse train corresponding to the position of said exposure spot on said glass master board;

a spindle rotation ordering pulse generating circuit for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, a number of spiral segments and a track pitch of said spiral;

a slider movement ordering pulse generating circuit for generating a slider movement ordering pulse train based on the starting radius position of said spiral, the number of spiral segments and the track pitch of said spiral;

a spindle control circuit for performing a feedback control operation of the revolution rate of said spindle motor based on of the spindle rotation ordering pulse train and the pulse train from said spindle encoder;

a slider control circuit for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder; and

a control section for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor and that of the slider are respectively controlled in accordance with said spindle rotation ordering pulse train and said slider movement ordering pulse train both generated from the pulse train of the frequency divided

fundamental clock having pulse numbers proportional to the ideal railroad track length determined by an equal rotation angle or an optional rotation angle Θ_c in a spiral segment identified with a line segment on the spiral divided by said equal rotation angle or said optional rotation angle Θ_c, per one revolution of said spindle, the start radius position of said spiral, the number of said spiral segments, and the track pitch of said spiral, per each one revolution of said spindle.

66. A method of controlling a CLV drive including a CLV drive for a spindle motor rotating a glass master board painted with a photoresist and another CLV drive for a slider moving an optical pickup including a focusing optical system for focusing the laser light and radiating the focused laser light onto said glass master board, each said CLV drive being respectively controlled by a spindle rotation ordering pulse train and slider movement ordering pulse train, both pulse trains being generated by a frequency-divided fundamental clock pulse train having a frequency proportional to an ideal railroad track length determined by a start radius position of a spiral track, the number of segments making up the spiral track, and track pitch of said spiral track, per one revolution of said spindle.

67. A method of controlling a CLV drive including a CLV drive for a spindle motor rotating a glass master board painted with a photoresist and another CLV drive for a slider moving an optical pickup including a focusing optical system for focusing the laser light and radiating the focused laser light onto said glass master boar, each said CLV drive being respectively controlled by a spindle rotation ordering pulse train and a slider movement ordering pulse train, both pulse trains being generated by a frequency divided fundamental clock pulse train having a frequency proportional to an ideal railroad track length determined by an equal rotation angle or an optional rotation angle Θ_c in a segment identified with a line

segment on the spiral railroad track divided by said equal rotation angle Θ_c, per one revolution of said spindle, a start radius position of said spiral, the number of said segments, and the track pitch of said spiral, per each one revolution of said spindle.

68. A CLV disc format constructed with a succession of sectors,

wherein, on a first track, with Ro being a CLV format starting radius and P being a spiral track pitch, a physical basic length is determined such that a railroad track length per one spindle revolution $2 \times \pi \times Ro + \pi \times P$ is an integral multiple of a fundamental clock or finite figure times capable of being provided at the time of an operation calculation; and

wherein, on the second and subsequent tracks, the physical basic length is determined such that the increasing railroad track length per one spindle revolution $2 \times \pi \times P$ is an integral multiple of the fundamental clock or finite figure times capable of being provided at the time of the operational calculation.

69. A CLV disc format constructed with a succession of sectors,

wherein, in a first segment with Ro being a CLV format starting radius and P being a spiral track pitch, a physical basic length is determined such that a railroad track length of the first segment $\theta_c \times Ro + P \times \theta c^2/(4 \times \pi)$ in the segment identified with the line segment on the spiral track created by dividing one revolution of said spindle with an equal rotation angle or an optional rotation angle θc; and

wherein, in a second and subsequent segments, the physical basic length is determined such that the increasing railroad track length of the second and subsequent segments $P \times \theta c^2/(2 \times \pi)$ is an integral multiple of a fundamental clock or finite figure times capable of being provided at the time of an operational calculation.

70. A recording medium made by practicing an exposing operation by use of said

CLV disc format as defined in Claim 68.

71. A recording medium made by practicing an exposing operation by use of said CLV disc format as defined in Claim 69.

72. An optical disc master board exposing apparatus comprising:

laser light source means for emitting laser light for exposing a glass master board painted with a photoresist;

exposure signal generating means for generating an exposure signal in order to expose said glass master board in synchronism with a fundamental clock;

light modulator means for turning on and off said laser light emitted from said laser light source means based on said exposure signal;

optical pickup means including a focusing optical system for focusing said laser light turned on and off by said light modulator means and radiating said same laser light on said glass master board as an exposure spot;

spindle motor means for rotating said glass master board;

slider means for moving said optical pickup means in a radius direction of said glass master board;

spindle encoder means for outputting a pulse train corresponding to the rotation of said spindle motor means;

linear encoder means for outputting another pulse train corresponding to a position of said exposure spot on said glass master board;

spindle rotation ordering pulse generating circuit means for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, the number of spiral tracks, and the track pitch of said spiral;

slider movement ordering pulse generating circuit means for generating a slider movement ordering pulse train based the starting radius position of said spiral, the number of said spiral tracks, and the track pitch of said spiral;

spindle control circuit means for performing a feedback control operation of the revolution rate of said spindle motor means based on the spindle rotation ordering pulse train and the pulse train from said spindle encoder means;

slider control circuit means for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder means; and

control means for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor means and that of the slider means are respectively controlled in accordance with the spindle rotation ordering pulse train and said slider movement ordering pulse train generated from a pulse train of a frequency divided fundamental clock having pulse numbers proportional to an ideal railroad track length determined by the starting radius position of said spiral, the number of said spiral tracks, and the track pitch of said spiral, per each one revolution of said spindle.

73. An optical disc master board exposing apparatus comprising:

laser light source means for emitting laser light for exposing a glass master board painted with a photoresist;

exposure signal generating means for generating an exposure signal in order to expose said glass master board in synchronism with a fundamental clock;

light modulator means for turning on and off said laser light emitted from said laser

light source means on the basis of said exposure signal;

optical pickup means including a focusing optical system for focusing said laser light turned on and off by said light modulator means and radiating said same laser light on said glass master board as an exposure spot;

spindle motor means for rotating said glass master board;

slider means for moving said optical pickup means in a radius direction of said glass master board;

spindle encoder means for outputting a pulse train corresponding to the rotation of said spindle motor means;

linear encoder means for outputting another pulse train corresponding to a position of said exposure spot on said glass master board;

spindle rotation ordering pulse generating circuit means for generating a spindle rotation ordering pulse train based on a starting radius position of a spiral, a number of spiral segments, and a track pitch of said spiral;

slider movement ordering pulse generating circuit means for generating a slider movement ordering pulse train based on the starting radius position of said spiral, the number of said spiral segments, and the track pitch of said spiral;

spindle control circuit means for performing a feedback control operation of a revolution rate of said spindle motor means based on of the spindle rotation ordering pulse train and the pulse train from said spindle encoder means;

slider control circuit means for performing a feedback control operation of the slider movement based on the slider movement ordering pulse train and the pulse train from said linear encoder means;

control means for controlling the respective construction elements in accordance with the information from said respective construction elements,

wherein the drive of the spindle motor means and that of the slider means are respectively controlled in accordance with the spindle rotation ordering pulse train and said slider movement ordering pulse train generated from a pulse train of a frequency divided fundamental clock having pulse numbers proportional to an ideal railroad track length determined by an equal rotation angle or an optional rotation angle θc in a spiral segment identified with a line segment on the spiral divided by said equal rotation angle or said optional rotation angle θc, per one revolution of said spindle, the start radius position of said spiral, the number of said spiral segments, and the track pitch of said spiral, per each one revolution of said spindle.